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the atmosphere in large enough quantity to enable it under such conditions as obtained the past summer to retain its leaves and thus to prolong the period of its vegetative activity.

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SYNCARPY IN MARTYNIA LUTEA

BY J. ARTHUR HARRIS

The fruit of *Martynia* is a strongly curved, beaked, loculicidally two-valved capsule in which the somewhat fleshy exocarp falls away in two parts and exposes the variously armed fibrous woody endocarp, which dehisces from the tip of the strongly curved back towards the base. On the median line of the upper and lower carpels or only on that of the upper carpel is produced a prominent crest. In *M. lutea* only the upper carpel is crested.* Internally the capsule is five-celled through the expansion of each of the parietal placentae into two laminae which extend to the wall, thus forming four lateral cells and one large central cell into all of which the seeds extend from the margins of the laminar placentae.

In *M. lutea* growing on the grounds of the Missouri Botanical Garden I found the two cases of syncarpy which are figured here. Externally, they are identical in form while the internal structure is clearly seen from the figure of the cross-section of one of the fruits. The two specimens were found late in the fall after the disappearance of the exocarp so that any evidence offered by that part of the fruit is not available.

The relatively greater size of the abnormal fruit is shown by the cross-sections given. The relation of the elements of the fruit to the peduncle is worthy of notice. In the normal fruit the

* Here I use upper and lower in the popular instead of in the strict morphological sense of dorsal and ventral. Britton and Brown in their Illustrated Flora evidently do the same. They say of *Martynia*: "the endocarp * * * crested below or also above," and of *M. Louisiana* Mill. (= *M. proboscidea* Glox.): "the endocarp crested on the under side only." The figure given represents the fruit in an inverted position, the horns turning downward instead of upward, so that the statement appears to be an oversight due to lack of familiarity with the habit of the plant.

crest lies approximately in the plane of the peduncle, while in the fruits here under consideration this plane passes approximately between the two crests of the double fruit, through two of the four parietal placentae, as indicated by the dotted line.

The armature is similar to that of the normal fruits. In both of the examples observed, the crests lie to either side of the uppermost section and the plane of the peduncle.

The determination of the morphological relationships of the parts of the fruit is not easy or finally satisfactory with only mature material available, but the following suggestions seem helpful.

The position of the four parts of the beak can offer little evidence of value owing to the ease with which their form might be modified. The inner flattened surface of the upper and lower are approximately opposed to each other and the same is true of the lateral elements of the four-parted beak.

Internally, the anomalous capsules show four parietal placentae, each expanded into two laminae upon the edges of which the seeds are borne, very similar to those of the normal fruit. The cavities are poorly defined since the ovule-bearing edges do not reach the walls.

Each of the claws (half of the beak of the fruit) of the ripe and opened normal fruits represents not the distal prolongation of a single carpel but the edges of both carpels, as is very clearly seen from a section or from the conspicuous grooves marking on the dry fruit the position of the placentae. This is also true of the double fruits.

On the peduncle the flowers are arranged spirally, so that if we conceive of the abnormal fruit as formed from the primordia of two successive flowers it will be seen that the synanthly will be in part dorsal and in part lateral. This may explain the relation of the parts of the fruit to the peduncle, as described above, and the position of the crests on either side of the uppermost of the four sections of the fruit. The accompanying diagram may make clear a hypothesis as to the composition of the fruit. In this diagram the walls of the two component fruits are indicated by the difference in shading. The position of the crested outer

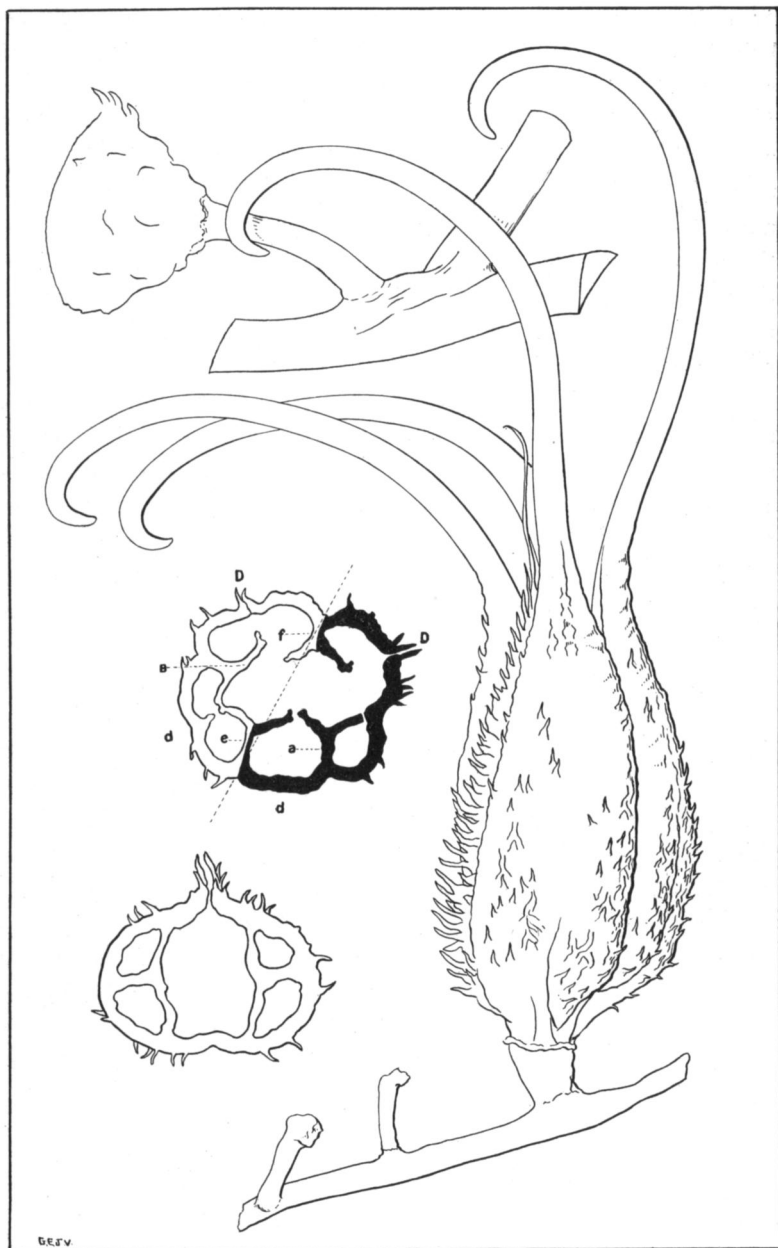


FIG. 1. Syncarpy in *Martynia lutea*.

or dorsal suture of the two carpels is very easily and surely established at *D*, *D*. In the normal fruit a smooth or uncrested dorsal suture must be sought beyond a placenta to either side of this. In the normal fruit the uncrested dorsal suture is represented by a smooth furrow, the only *smooth* furrow on the fruit, the position of the placentae being indicated externally by a groove of about the same rough nature as the remainder of the surface. In the monstrous fruits smooth furrows are found at *d*, *d*, and since these are the only positions which fulfil the condition mentioned above for the uncrested outer or dorsal suture, their nature seems clear. In the fruit, then, two placentae, *a* and *B*, represent the edge of carpels of a single fruit, while the other two, *e* and *f*, represent the edges of carpels from the two fruits; in the same way, the upper and the lower of the four horns are each composed of parts from the two joining fruits, while the two lateral horns each represent the edges of the two carpels of a single fruit. It is evident that if this assumption be true, some of the parts of the fruit have a quite different proportional development from what they do in the normal fruit, but this is not at all surprising.

While, as stated above, the evidence of young material is very desirable, the explanation here given is the only one I am able to suggest which will explain the observed sutures as a case of syncarpy in which the coalescence of the carpellary elements of the two fruits has taken place along the edges which form the ventral sutures in the normal fruit.

The flowers are usually borne in a raceme, but it occasionally happens that one is produced from the main stem a little below the base of the raceme. Such a case is illustrated in the figure.

The figure represents a lateral view of one of the syncarpous fruits, both of which were approximately identical in form, cross-sections of normal and abnormal fruits, and the anomalous insertion of a fruit on the main stem below the pedicel.

MISSOURI BOTANICAL GARDEN.